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A BREATH OF FRESH AIR

Dr Paul Beckett looks at the increasing demand to monitor and assess the dangers of airborne pollutants and the need for mitigation measures to reduce emissions from the construction of new developments

In recent years there has been an increasing demand to monitor the dangers of and general air quality. This is due to the fact that substances we put into the air can affect the health of plants, animals and people, as well as contribute to the problem of global warming and cause a general nuisance. The main pollutants affecting air quality in the UK are nitrogen dioxide, fine particles, ground level ozone, carbon monoxide, sulphur dioxide and cancer causing hydrocarbons such as benzene and PAHs.

The construction industry notoriously produces a large amount of air pollution, mainly through emissions of dust, fine particles and exhaust gasses from various construction activities and from the operation of heavy plant and machinery. Most developers realise that by considering such emissions, and making plans to mitigate their impact during construction operations, the environment and developers' business interests can be secured for the future. Environmental assessments of new developments are essential tools in ensuring that the impact of a construction project is kept to a minimum right from the outset.

MEASURING BY MONITORING

When considering airborne pollutants from construction sites there are various ways in which they can be measured and monitored. Dust sampling is probably the most common form of monitoring and, depending on the type of equipment used, chemical analysis to look for toxic compounds can be undertaken at the same time. There are a variety of dust sampling devices available, from simple deposit gauges to measure the amount of soiling on a surface, to real-time light scatter devices that can measure the number and size fraction of dust particles on a second by second basis.

Another common type of pollutant monitoring on construction sites is airborne asbestos sampling. This is carried out using a mobile laboratory whereby pumps and filters are installed around a site and microscopes are used to determine the number and types of asbestos fibres found. This is carried out over a period of a few hours in order to provide results quickly as the presence of asbestos on a construction site can have significant health issues to the public and to workers who might be exposed to it.

Usually on contaminated sites that require remediation, sampling of volatile compounds is also often carried out. This is important if such compounds are flammable or toxic. Hand held PIDs (Photo Ionisation Devices) are used to give instant readings on volatile compound concentrations in excavations or other enclosed spaces. Longer term monitoring using absorbent wools in diffusion tubes can also be used to determine average concentrations of toxic or odorous compounds over a

few hours, a week, a month or sometimes even longer.

In addition to dust, the emission of odours can be a significant problem on construction sites. These are usually from the exposure of compounds in the soil as earthworks are carried out, although some construction materials can have strong odours too, for example, treated woods, tars, sealants, paints, finishing solvents and preparations, diesel fumes, stored fuels and hydraulic fluid. Odours can be particularly strong on contaminated sites as they are being remediated; there are lots of old gasworks across the UK that have become redundant due to the way that the national gas transmission network is now operated and as they are cleaned up, significant releases of 'petrol' smells are often produced.

Odour impacts can be assessed before they are emitted using dispersion modelling software. This allows the impact of an odour to be gauged so that appropriate mitigation measures can be put in place when work on the site commences.

MODELLING

Air dispersion computer models can be useful to determine the impact of specific activities on construction sites. These use detailed meteorological data and emission rates for the generation of dust and other pollutants. Emission rates can be obtained from direct measurement of sources on other sites or from various calculations in the literature. Due to the way in which most construction sites operate, with activities only usually taking place at certain locations for relatively short periods of time as the programme progresses to completion, detailed modelling is not usually advised. However, general emission factors for broad construction site activities are available and these can be useful for modelling the predicted extent of air quality impacts on the area surrounding a construction site.

WHAT GUIDANCE IS THERE?

The London Air Pollution Planning and the Local Environment (APPLE) working group has produced a London-wide code of practice for the control of dust from construction works. This suggests a number of mitigation measures that should be adopted in order to minimise air quality impacts in the capital and is a very useful tool for those who operate in other parts of the UK.

The APPLE code of practice recommends the production of environmental risk assessments for all site activities during construction. This seeks to audit all potential sources of emissions and helps to formulate appropriate method statements and systems of work that will minimise any environmental impacts. The installation of a Construction Environmental Management Plan (CEMP) is one way to achieve this.

The CEMP should provide a documented system for minimising any environmental impacts on the ▶

surrounding area during the construction of a development. As recommended in the APPLE guidance, this should also involve monitoring of emissions and providing alert procedures should any environmental thresholds be exceeded. The CEMP should also require close liaison with the local community to allay any particular concerns that they might have and to respond to any issues that could arise during the construction process.

MITIGATION AND DAMAGE LIMITATION

Demolition and clearance activities are often the most significant sources of dust emissions. However, they can usually be completed in a relatively short period of time. Therefore some of the most significant emissions of dust can often be constrained to such a period. If this period is programmed to take place in the winter, when conditions are generally wetter, emissions can be further reduced (although heavy construction vehicle movements in winter on wet, muddy surfaces can pose other safety and environmental problems).

Probably the main potential impact from dust emissions from construction sites is nuisance to residents living in the local area. These are likely to be limited to locations within approximately 100m of the dust sources and are only likely to be significant in certain weather conditions (e.g. downwind of the source during dry weather). Consideration of prevailing winds and the proximity of residential or other sensitive land uses close to a construction site can therefore be important when planning mitigation measures to control impacts.

FUTURE CONSIDERATIONS

In a society where we are growing increasingly aware of the impact that we have on the environment, those in the construction industry that choose to work more sustainably as part of their general practice will undoubtedly reap the environmental and business benefits of this way of working. It is essential for the construction industry as a whole to see their environmental impact as a serious problem that needs addressing and from consumer pressure to an increased tax burden there is more and more motivation for them to explore sustainable development. If they fail to do so now, there is a high risk the government will impose tighter sanctions in the future as they clampdown on businesses that stand in the way of meeting increasingly rigorous environmental targets and legislation.

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THE TEN MOST POLLUTANT-GENERATING CONSTRUCTION WORKS

The main activities on construction sites that have the potential to generate dust include the following:

- Demolition of existing structures
- Construction and road traffic travelling over unpaved and/or soiled road surfaces
- Concrete crushing and/or removal of construction wastes from sites
- Earthworks associated with level changes
- Ground clearance works
- Excavations for services and/or foundations
- Some finishing and refurbishment activities, for example plastering, sanding and disposal of associated wastes.
- Wind blow from stockpiles of friable materials
- Concrete batching or localised use of cement powder
- General construction materials handling

THE TOP SIX MITIGATION MEASURES

- The use of appropriate sheeting and screening during the demolition of existing buildings on the site
- The positioning of internal haul routes, delivery areas, stockpiles and particularly dusty items of construction plant away from neighbouring properties
- The use of water, administered by bowser and/or sprinkler systems, on the site access, on internal haul routes and on any other areas where dusty materials are being handled or stored
- The use of a road sweeper at appropriate times on the access road and along the local highway, if and when it becomes soiled
- The use of appropriate dust suppression covers on particular items of construction plant
- The minimising of drop-heights of all loading and unloading activities that involve the transfer of dusty materials