Chemical Hazards and Poisons Division
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Substitute Fuels in Cement Kilns

Introduction

The Health Protection Agency (HPA) supports Primary Care Trusts (PCTs)/Local Health Boards (LHBs) in their role as 'Statutory Consultees' for the Pollution Prevention Control (PPC) regime. Statutory Consultees are considered to have special knowledge or expertise.

The use of substitute fuels in cement kilns is subject to Integrated Pollution Prevention Control regulation and has been the source of considerable public concern. Consequently the HPA has produced this initial position statement on the public health consequences of these processes in order to help inform the debate. The HPA is referring this issue to the Committee on Medical Effects of Air Pollutants (COMEAP) for detailed consideration of health/public health aspects and advice.

Cement Kilns

Cement is made from ground clinker (a compound manufactured from lime and silica with small amounts of alumina and iron oxide) mixed with gypsum. The clinker is produced in rotary kilns operating at extremely high temperatures (c.1450 °C). Consequently, the process is very energy intensive and the industry has moved to reduce fuel costs including sourcing alternative non-fossil derived fuels. These latter are the 'substitute fuels' and include materials such as waste tyres and secondary liquid fuel derived from industrial solvent wastes and some aqueous wastes. The type of material which can be used as substitute fuel is subject to the requirements of the Environment Agency's Substitute Fuels Protocol. The use of cement kilns to burn these wastes also has benefits to the UK in meeting its obligations under the Kyoto accord and European legislation (the EU Landfill Directive for example prohibited landfill disposal of whole scrap tyres in 2003 and shredded tyres will be prohibited by 2006).

However in some areas, there has been considerable public concern about the health risk of emissions generated by burning such fuels in cement kilns particularly given the nature of some of the materials used, the high temperatures involved and the perception that kilns are being used for a purpose for which they were never designed.

Public Health Impact

In common with most other industrial processes, there have been few, if any studies of effects on the general public from exposure to emissions from cement kilns, whether burning conventional or substitute fuels. However based on data from the regulatory process on the types of pollution emitted, emission rates, and predicted ground level concentrations it is possible to make predictions of the public health impact of the

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emissions. Such 11th October 2004 assessments show a negligible impact, whether using conventional or substitute fuels, which would not be detectable through any currently available health surveillance method. A great deal is known about the process characteristics from the extensive use of substitute fuels in Europe and trials conducted in the UK and elsewhere. The very high temperatures and long residence times achieved in the kilns produces a highly efficient environment for the destruction of organic compounds. The highly alkaline conditions decompose chlorinated organic wastes and acid gases and the process retains a large proportion of waste material within the clinker itself.

This process environment means that substitute fuel is no more polluting to the environment than conventional fuels and for some key pollutants is actually less so. The use of substitute fuel has been shown to reduce NOx emissions by 30-40% in some cases. Nearly 100% of refractory metals are absorbed by the clinker. Extremely volatile metals such as mercury and thallium are not incorporated into the clinker to the same degree and these metals are, therefore, carefully controlled in the substitute fuels. Cement kilns are only a very minor source of organic pollutants and dioxin emissions.

Concerns have been expressed that increased emissions of fine particulate matter may give rise to an enhanced health risk. The HPA is not aware of any evidence to support this contention and the available information indicates that particle emissions from a cement kiln will consist of larger particles than those typically found in air polluted by vehicle exhaust. City centres and other areas polluted by vehicle exhaust typically contain far higher concentrations of particles, including fine and ultrafine particles, than are likely to result from the emissions of a cement kiln.

However, some cement kilns do produce large amounts of oxides of nitrogen and sulphur and there is potential for the release of contamination such as cement kiln dust unsuitable for recycling. Some components of substitute fuels are potentially harmful and require effective and appropriate handling and processing. Consequently appropriate monitoring of key pollutants is required to ensure that the process is being well managed.

Conclusion

It is evident that cement kilns, if well managed and maintained, are efficient and effective processes for burning substitute fuels. While changes in emissions do occur they are modest and site specific. There will consequently be little change in the pollution levels in the air that people breathe as this is largely determined by other sources such as traffic.

We are unaware of any evidence that burning substitute fuel has caused adverse health effects.

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The regulator should keep the monitoring data from each site under constant review and any major change in the emissions of a toxic constituent that would be a potential hazard to health after dilution of the plume, should lead to immediate remedial action.

The appropriate PCT/LHB, as part of its general public health function, should maintain routine surveillance of its population's health, but since currently available evidence suggests that the public health impact of emission changes is negligible, there is no justification for additional specific health studies around plants burning substitute fuel.

13th October 2004