Public Health England

FIRE AT LAWRENCE RECYCLING, KIDDERMINSTER

PUBLIC HEALTH ENGLAND (PHE) COMMENTS ON TRL PROJECT REPORT CPR2684

'Monitoring of ambient dioxin, furan, PCB and PAH concentrations at Lawrence Recycling, Kidderminster during July 2013'

Introduction

The above TRL report has been reviewed by PHE toxicology specialists. Based on their advice and interpretation, this statement provides our view of the significance of the findings in respect of potential concerns for public health.

The report does not reflect an occupational assessment and as such it is not possible for us to estimate the workplace exposure. The remit for occupational exposure assessment lies with the Health and Safety Executive.

The TRL report

The TRL report presents monitoring data for certain organic chemicals (including dioxins) taken over a 17 day period, when the fire at Lawrence Recycling site was smouldering.

The health risk assessment approach

PHE has assessed the TRL results and assumed that the air concentrations reported are representative of the whole 52 day period from the start of the fire (16 June 2013) until the fire was put out (7 August 2013).

When considering the potential health effects of the chemicals monitored by TRL, long-term exposures are generally regarded as the most relevant. Generally, health-based environmental standards and guidelines are calculated based on **annual average concentrations** in air.

Because the 52 day period represents less than 15% of a calendar year, direct comparisons with environmental guidelines (and reported typical background concentrations) are difficult. So, in evaluating the likelihood of health risks, we have also considered the contribution that this relatively short-term exposure would make to overall longer-term exposures.

Dioxins, furans and PCBs

In the majority of cases for this family of chemicals inhalation is considered to be a **minor** pathway of exposure with food being the main source of exposure, but given the relatively high air concentrations, PHE's toxicologists have assessed the contribution of inhalation exposures to existing background intakes.

Exposure to dioxins, furans and dioxin-like PCBs following inhalation at the reported concentrations would exceed the tolerable daily intake (TDI)[1] of 2pg per kilogram body weight by approximately 5 times, without taking into account background exposure from food.

However, because dioxins have a long half-life, the UK expert advisory body, Committee on Toxicity of Chemicals in Food, Consumer Products and the Environment (COT) has considered that the **body burden[2] ,** rather than daily intake, is the most appropriate measure for evaluating the risk of adverse health effects.

PHE considers that this relatively short exposure is likely to have increased body burdens in the local population to some extent, which is undesirable. However, these body burdens are likely to be within the levels experienced in the UK during the last 40 years (COT, 2001).

Overall, this exposure to dioxins, furans and PCBs has eroded some of the margin of safety which is applied to derive environmental public health guidelines, and while this is undesirable, it is **unlikely to represent a significant risk to public health.**

Polycyclic aromatic hydrocarbons (PAHs)

Concentrations of 15 PAHs were measured, and the total average concentration over the 17 days of monitoring was higher than the Department of Environment, Food and Rural Affairs (Defra) 2010 data. However, the Defra concentrations are averaged over a whole year and so a direct comparison is limited.

Health-based environmental standards and guidelines for PAHs are based on concentrations of benzo[a]pyrene (B[a] P) which is usually found in PAH mixtures. The reported average ambient concentration of B[a] P over the 17 days is below the EU target value of 1 $ng \cdot m^{-3}$ (annual average) for B[a]P but higher than the UK Air Quality Objective of 0.25 $ng \cdot m^{-3}$ (annual average) (Defra, 2007), though the difference in averaging times should be noted. Levels such as those reported have been measured previously in ambient air in the UK (AEA 2010).

Health risk assessment for PAHs is based on increased cancer risk for lifetime exposure; the elevated exposure which occurred over the 52 days of the fire equates to approximately 0.2% of a typical lifetime in the UK. Our assessment concludes that any increase in the lifetime risk of cancer associated with this short-term, albeit elevated, exposure to B[a] P is likely to be small.

Particulate Matter

Particulate matter was measured as PM_{10} for 5 days from 5 to 9 July. For 4 days the concentrations were low but for one day (8 July) the 24 hour mean reached 122 $\mu g \cdot m^{-3}$, which is in the 'Very High' pollution band of the UK Daily Air Quality Index [3] (Defra, 2013).

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[1] The Tolerable Daily Intake (TDI) is the amount the body can take in on a daily basis in without adverse health effects.

[2] **Body burden** is the average amount of these chemicals actually remaining present in body tissues, rather than the amount ingested or inhaled.

[3] For PM_{10} the "Very High" band applies when the 24-hour concentration exceeds 100 $\mu g \cdot m^{-3}$

At this concentration people with heart and or lung conditions may have noticed an increase in their symptoms and people with asthma may have had to use their inhaler more frequently. The available data cover only a very short time period, so we are unable to comment on the likelihood of adverse effects associated with particulate matter during other periods of the fire.

Discussion

The monitored levels of all the contaminants are higher than the annual averages from 2010, but the impact is unlikely to present a significant risk to public health.

The annual values are averages across the whole year and therefore include periods of both higher and lower concentrations. It should be borne in mind that these results are data from 17 days only.

There are also a number of other uncertainties which should be taken in to account:

1) In the absence of data for the whole period the fire was burning and smouldering, we have assumed that the monitored levels would be experienced over each of the 52 days of the fire. However, they may not be a true representation of the whole time period, as concentrations could have been higher or lower depending on the status of the fire and local weather conditions.

2) For residents it is unlikely that they would have been exposed to these concentrations, as the nearest residential properties are 600 metres away from site and to the north of the site, while the prevailing wind was from the north-east. Other residents were over 1 km away in other directions.

3) For people working in other premises near to the fire or visiting these premises, while their exposures may have been higher (as they were closer to the fire), they would be unlikely to have spent 24 hours per day on site, so their exposure each day would have been considerably less. For the workforce, it is likely that many would have been working indoors which would also reduce exposure, especially during the early stages of the fire as closing windows and doors was advised.

Conclusion

Overall, we consider that in this fire concentrations of dioxins, furans, PCBs and PAHs monitored were high, but that public exposure for the duration of the fire is unlikely to have resulted in a significant risk to public health.

This is because the estimated exposures are considered to make a small contribution to body burden for dioxins, furans and PCBs which accumulates over many years. Similarly, the effects of PAHs are of concern after long-term exposure. The estimated increase in risk of cancer from the additional exposure to PAHs from the fire is likely to have been small.

As the area around the fire was predominantly commercial rather than residential, this also reduces the likely extent of exposure of the local population.

References

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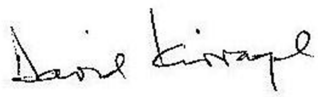
World Health Organisation (2000), air quality guidelines for Europe, 2nd edition; available from: http://www.euro.who.int/air/activities/20050223_3

Signed on behalf of Public Health England



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