

Study of Ambient Air Quality at Silverdale

15 January 2019 and 25 June 2019

The Environment Agency is responsible for the regulation of the Environmental Permit for Walleys Landfill Site, in Newcastle-under-Lyme, Staffordshire. The site has been operational since 2005 and accepts non-hazardous commercial and industrial waste. The landfill is located in an urban area, with residential properties within 100 metres of the site boundary. The current operator is Red Industries RM Ltd.

The requirement to measure emissions to air from the landfill site are set out in the environmental permit. In addition to operator monitoring on the site, the Environment Agency carried out an ambient air monitoring study between the 15 January 2019 and 25 June 2019. The overall objective of the study was to identify the local sources of air pollution and to quantify the environmental impact of the emissions from these sources on the surrounding area and the local community.

What did the study involve?

The Ambient Air Monitoring (AAM) team deployed a Mobile Monitoring Facility (MMF) to the north of Walleys landfill site in the car park of Garners garden centre between the 15 January 2019 and 12 February 2019 (28 days). The MMF was then relocated approximately 60 metres to the east, within the grounds of Garners garden centre between the 28 February 2019 and 25 June 2019 (118 days). Five minute average concentrations of particulate matter, hydrogen sulphide, methane, oxides of nitrogen, benzene, toluene, m&p-xylene and ethylbenzene were measured over the monitoring period alongside wind direction, wind speed, temperature and pressure measurements.

One of the possible impacts associated with landfill sites is nuisance odours. Quantifying and characterising odours is very challenging because each person's sensitivity to odours can vary. Measuring odours can be very difficult because the gases are made up of a mixture of

different pollutants. Landfill gas is made up of a large proportion of methane. Gas measurements completed by the site operator for Walleys Landfill site show the gas quality is generally around 50% methane, which is typical for a landfill of this type.

By measuring methane we can infer if there is a source of landfill gas being measured at the monitoring location, from the direction of the landfill site. The gases we were able to measure which have an associated odour were hydrogen sulphide and toluene.

Particulate, nitrogen dioxide and benzene, concentrations were compared against relevant Air Quality Strategy objectives for human health. Toluene, ethylbenzene and m&p-xylenes were compared with their respective Environmental Assessment Levels (EALs). Hydrogen sulphide and toluene concentrations were compared against the relevant World Health Organisation guidelines for human health and odour. There are no objectives or guidelines for methane emissions, its main environmental impact is from its relatively high potential for global warming.

An assessment of the meteorological conditions over the monitoring period was made and showed that the wind often came from a westerly direction during the main monitoring period. The wind direction and pollutant data was used to assess from which wind directions the highest concentrations were measured. We also looked at how pollutant concentrations varied at different times of the day.

What did the results show?

Comparison of the particulate, nitrogen dioxide and benzene data from the monitoring at Silverdale with the Air Quality Strategy objectives showed that the monitoring location was subject to concentrations that would be expected to meet their respective AQS objectives. Toluene, ethylbenzene and m&p-xylenes were found to be

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below their respective Environmental Assessment Levels.

The hydrogen sulphide and toluene data were compared with their respective World Health Organisation (WHO) guidelines. Toluene was found to be below the specified health and odour limits. Comparison of the hydrogen sulphide data between the 15 January 2019 and 12 February 2019 (28 days) with the WHO guidelines showed that concentrations were below health limits, but exceeded odour limits for 6% of the shorter monitoring period. Comparison of the hydrogen sulphide data between the 28 February 2019 and 25 June 2019 (118 days) with the WHO guidelines showed that concentrations were below health limits but exceeded odour limits for 1% of the monitoring period.

Consideration of the directional sources of hydrogen sulphide and methane suggested that the highest contributing sources were seen from the direction of the landfill site, alongside lower contributing sources.

Consideration of the directional sources of oxides of nitrogen suggested that the highest contributing sources were seen from the direction of the landfill site from the gas management compound, alongside lower contributing sources.

Further work

No further ambient air monitoring is currently planned to take place at Silverdale by the Environment Agency but our regulatory work will continue at Walleys landfill site.

This summary relates to information reported in detail in the following output(s):

Report: AAM/TR/2019/12

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