Air Quality Group Overview Report (November 2024)

1. Introduction

This report has been produced by the multi-agency Air Quality Group (AQG) established in response to complaints of odour arising from Withyhedge Landfill Site. It provides an overview of the position related to air quality monitoring undertaken by a number of agencies in response to community concerns and complaints regarding these odour emissions.

2. Background

Withyhedge Landfill is operated by Resources Management UK Ltd (RML) under the provision of an Environmental Permit – permit number EPR/MP3330WP.

In October 2023, Natural Resources Wales (NRW), and to a lesser extent Pembrokeshire County Council (PCC), started to receive a sustained volume of complaints from the communities surrounding the landfill reporting offensive odours. The offensive odours are caused by the uncontrolled emissions from the landfill.

3. Purpose of the strategic Incident Management Group and Air Quality Group

In response to these complaints and ongoing concerns a multi-agency groups, namely a specific Air Quality Group (AQG) and strategic oversight Incident Management Group (IMG) were set up in February and March 2024 respectively. The IMG is responsible for:

'maintaining an overview of the Incident Response by individual member bodies, as well as the Air Quality Group, under their role and remit to Withyhedge Landfill odour issues, as well as oversight of the communications strategy group, co-ordinating external communications to stakeholders and the wider public. The Incident Management Group will ensure progress is maintained in response to the odour incident and appropriate communications are provided.'

The AQG was established to in February 2024 initially chaired by the NRW to discuss the scope of air quality monitoring required with a view to establishing the quality of air people are exposed to and determine potential risk to human health.

3.1 Aim of the AQG

The Air Quality Group aims to bring together multi-agency technical experts to assess ambient air quality including emissions from the landfill site that have the potential to impact air quality, to inform the development of a community air quality monitoring programme; and to assess the potential risk to public health against available health standard/guidelines.

3.2 Role & Objectives of the AQG

These include:

i. Reach a consensus between PHW, Pembrokeshire CC and NRW on an agreed way of carrying out air quality monitoring around the landfill.
ii. For PHW to provide public health advice via a dedicated forum

iii. Consider information from modelling, monitoring and other similar incidents to provide interpretation of the monitoring data and assess risk to air quality and public health
iv. Liaise with the site operator and their appointed air quality monitoring contractor on monitoring requirements

NRW initially chaired the AQG and Pembrokeshire County Council took over on the 16th May 2024 following a decision at IMG on the 7th May.

4. Monitoring Programme

Since February 2024 monitoring has been carried out, principally of Hydrogen Sulphide (H2S).

At an early stage the AQG determined that H2S should be a key parameter for monitoring. It is a pollutant of concern and a known component of landfill gas. Landfill gas is typically dominated by methane and carbon dioxide. Numerous other compounds may, however, also be present and some of these can be odorous. Such compounds are often sulphur based and can include hydrogen sulphide. As hydrogen sulphide can give rise to odour and can be readily measured, it is being used as a surrogate for the potential presence of landfill gas. It is however recognised that there are a wide range of compounds and sources that can also generate odorous compounds like hydrogen sulphide.

Monitoring commenced initially by Geotechnology Ltd on and off site in February 2024 with the use of static diffusion tubes for H_2S. As time went on and influenced by discussion through the AQG, additional methods were added, such as the use of Jerome monitors which were used for both reactive and short-term survey work at locations reflective of residential exposure.

Ricardo were independently jointly commissioned by PCC and NRW to provide static monitoring of H2S. The reason why this was commissioned was to provide consistent and continuous monitoring of background air quality. Prior to this, monitoring completed by NRW and PCC officers following subjective acuity methodology (i.e. witnessing odour levels) was responsive in nature as well as at set times of the day, but difficulties were experienced in getting a consistent and reliable data set of results.

Additional monitoring was also carried out by PCC and NRW using handheld Jerome monitors.

The monitoring strategy developed by the AQG, reflects locations where complaints have been received and where members of the public are likely to be. The AQG has acknowledged that the monitoring equipment utilised has advantages and disadvantages.

- Diffusion tubes have a long exposure time, averaging out peaks (and troughs) of gas concentrations.
- The Jerome analyser is operating close to its limit of detection (LoD), this LOD is near the health-based standards used to in the public health risk assessment. It has a limit of detection of 5 µg/m3 ± 1 µg/m3 (brookfieldengineering), which equates to approximately 20% confidence at the limit of detection. The Jerome

monitor also has the advantage that it can be installed at a fixed location, providing there is a power supply and the location is secure.

- VOC diffusion tubes can present artefact data because of laboratory techniques. Additionally, at low concentrations the technique has a low confidence in the compounds identified.
- Static monitor (Model T102 Analyzer) and weather station installed at Spittal School by Ricardo. This equipment has a lower limit of detection (close to zero ppb for H2S) than, for instance, the Jerome monitor.

The type of monitoring, be it static or mobile, can and will change over time. This enables the monitoring approach to be flexible. Further details of these different approaches can be seen below.

4.1 Comparison of Data

Results obtained have been compared to air quality guidelines, minimal risk levels and reference concentrations for H2S (see table below). Data extracted from the Jerome is required to be averaged over the 30 minute monitoring period in order for it to be compared against the WHO 30 minute average for H_2S. This includes data from the Ricardo Static monitor.

The short term WHO guideline value of 7 µg/m^3 (5 ppb) over a 30-minute averaging period is a short-term odour value protective of odour annoyance.

In accordance with the monitoring strategy agreed by the AQG, if the monitoring data exceeds the trigger level of 600 ppb (acute exposure guideline level (AEGL)-1, 30 minutes) then the AQG will be informed by email by the persons responsible for the monitoring within 24 hours with the AQG convened to review its risk assessment consider the next steps. Since the monitoring was established in February 2024 this threshold has not been exceeded.

WHO air quality guidelines	**ATSDR- MRL****	**US EPA RfC*****
30-minute (average)*	**Intermediate (up to 1 year)**	**For assessment of lifetime exposure**
7 µg/m^3 (5 ppb)	30 µg/m^3 (20 ppb)	2 µg/m^3 (1 ppb)
Based on odour annoyance	Based on lesions of the nasal olfactory epithelium in rats.	Based on lesions of the nasal olfactory epithelium in rats.
24-hour (average)		
150 µg/m^3 (107 ppb)		
Based on eye irritation in humans.		

*The WHO guideline value of 7 µg/m^3 (5 ppb) over a 30-minute averaging period is a short-term odour value protective of odour annoyance[1].

** An MRL is an estimate of the daily human exposure to a hazardous substance that is likely to be without appreciable risk of adverse non-cancer health effects over a specified duration of exposure. They are derived for acute (>1, ≤14 days), intermediate (>14, <364 days), and chronic (365 days and longer) exposure durations[2].

*** An estimate (with uncertainty spanning perhaps an order of magnitude) of a continuous inhalation exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime[3].

5. Data Sources

This overview report considers data sources from Geotechnology Ltd, Pembrokeshire County Council, Natural Resources Wales and Ricardo. Multiple key reports and summaries have been appended to this overview and further full reports are also referenced in this document and are hosted on the PCC web pages at:

Air Quality - Pembrokeshire County Council

a. Geotechnology Ltd

Geotechnology Ltd were commissioned to provide a monitoring regime on behalf of RML in response to concerns about health impacts from site emissions. This monitoring commenced on 5th February 2024 with H2S diffusion tubes on and off site to reflect residential population around the site. Consideration and monitoring of a short duration was carried out for Volatile Organic Compounds (VOC's) (as well as diffusion tubes for H2S). The VOC monitoring was ceased as it was considered through discussion via the AQG that the chemicals identified were below health- based standards and guidelines (where these exist) and not necessarily representative of emissions from site. Monitoring progressed to include short term spot Jerome monitoring as well as survey work using a Jerome monitor at residential locations. This monitoring continues.

Monthly reports from February 2024 can be seen at **Appendix 1**.

b. Pembrokeshire County Council

Acuity training for responsive odour monitoring was provided to officers from PCC's Public Protection Team by Ricardo in May 2024 and a programme of monitoring was carried out by officers from May to June 2024 following the same monitoring locations used by NRW. This monitoring was supplemented at times by Jerome monitoring but principally followed training and methodology provided by Ricardo for odour assessment. The result of this monitoring can be seen at **Appendix 2**.

Complaint monitoring was also carried out by officers from PCC in direct response to complaints from December 2023 and ad hoc monitoring around the site. This monitoring did not prove successful as most complainants did not call at the time of witnessing odours, and when officers did visit, the odour nuisance had since passed.

This acuity monitoring identified landfill odours at times but also noted odours could potentially be attributed to other sources arising in the area. This monitoring was ceased partly because results were not finding any significant landfill gas odours, partly due to dwindling direct complaints and then due to the landfill site ceasing to accept waste.

c. Natural Resources Wales (NRW)

NRW's primary role as regulator of the landfill site is to determine if polluting odours are identified at offsite locations. These assessments have been supplemented by the use of a Jerome monitor to obtain spot samples, and where landfill odours have been detected 30-minute average figures. The odour assessments follow a set route with fixed locations in the communities around the landfill from where complaints have been raised. On an ad-hoc basis additional locations may be included informed by incident reports and detections of odour when in transit between set locations.

Short term monitoring (continuous over a period of between a few days and a couple weeks) of H_2S has also taken place at fixed locations in Spittal, Scolton Manor and Crundale. NRW have used met data obtained through the static monitor at Spittal School to help determine weather conditions during monitoring periods in Spittal specifically.

These results can be seen at **Appendix 3.**

d. Ricardo Ltd (Preliminary Review report Appendix 4)

Independent monitoring by an external company has also been jointly commissioned by PCC and NRW to install a static monitor, which has as of 3 July 2024 been installed in a location in Spittal.

This equipment has allowed the air quality monitoring contractor, Ricardo Ltd, to carry out a real time hydrogen sulphide (H2S) monitoring survey, complete with associated reporting. However it is recognised that the static monitoring takes place in once static location which limits its coverage of air quality to this one location.

This monitor is scheduled to remain in place for six months, covering the upcoming winter season (until end December). Whether this monitoring is extended is currently under review in discussion with the IMG, PCC and NRW. As we wait for the site to recommence accepting waste it will be important to consider continued monitoring over the winter months due to cold weather conditions which have previously been found to contribute to conditions where increased complaints have been seen. This is due to cold temperatures hindering the dispersal of H2S gas.

To ensure precise data collection, the monitor is also equipped with a meteorological station, providing independent measurements of wind speed and direction.

Weekly odour monitoring reports can be seen at Air Quality - Pembrokeshire County Council

An interim monitoring report using ratified data up to the end of September 2024 can be seen at **Appendix 4**.

It is recognised that during the time the Ricardo static monitor has been in place coincides with the period when RML has not been accepting waste on site. Nevertheless, there would still be active landfill gas creation from the site and the flare is still operational.

The results from the Ricardo monitoring from July to September have been compared with the WHO odour annoyance guideline value of 7 µg/m3 (5 ppb) over a 30-minute averaging period and the WHO air quality guideline based on eye irritation in humans over a 24 hour average of 107 ppb.

The monitoring results as highlighted in the report in Appendix 4 have shown there are no exceedances of the guideline level for eye irritation. The monitoring does show that during the period from July to September there have been occasions when odour thresholds have been beyond 5ppb. These exceedances occurred on nine occasions over four different dates with the duration of each event being no longer than 30 minutes which amounted to 0.1% of the monitoring period. Furthermore, the overview also shows that on four out of the nine occasions when the level was exceeded, the average wind direction was not consistent with coming from the direction of the landfill. Ricardo have attributed this to other potential sources of hydrogen sulphide in the area around Spittal.

6. Public Health Wales (PHW)

Public Health Wales will continue to work with partners to advocate for site improvements in order to minimise any impact on the local community. PHW does not have regulatory responsibilities or powers around the management of a site or ability to carry out environmental monitoring.

We will continue to offer public health guidance to those living near Withyhedge. All PHW's health risk assessments and associated public health advice is publicly available on our website:

EN: https://phw.nhs.wales/topics/withyhedge-health-risk-assessments/

CY: https://icc.gig.cymru/pynciau/asesiadau-risg-iechyd-withyhedge/

7. Air Quality Group Conclusions

Since the establishment of the AQG in February 2024, and receipt of initial reports from air quality monitoring undertaken by Geotechnology Ltd, Jerome and acuity odour monitoring by NRW and PCC, it is recognised that the community have experienced periods of elevated levels of H2S beyond the WHO odour annoyance guideline value of 5ppb. This also coincided with a high number of complaints received by NRW from residents of the area, and a lesser number of complaints received by PCC. The diffusion tube results showed the long-term level of H_2S in the community appear to be below long term health-based guidance values. The AQG has reviewed the monitoring programme periodically, which led to the agreement to cease the VOC monitoring undertaken by Geotechnology, as it was considered that the chemicals identified were below health-based standards and guidelines (where these exist) and not necessarily representative of emissions from site.

Since May 2024, when the landfill site stopped accepting waste, together with a number of intervention measures on site to control the emission of H_2S, there has been a reduction in complaints received. The introduction of the Ricardo static monitoring has provided a number of benefits:

- more robust data due to the continuous nature of its air quality collection,
- ability to identify peaks at specific points in time,
- comparison with wind/ weather conditions and any potential activities occurring on the landfill site and wider surrounding community.

Although we recognise that the monitoring is only in one location, this was considered representative of local exposure with the best available options for connecting to available power sources whilst also being secure.

NRW and PCC have indicated previously that other odour sources exist in the communities surrounding the landfill. The Ricardo preliminary overview report corroborates this, in addition indicating that these sources may also be contributing to the hydrogen sulphide recorded at the static monitor.

In summary, the air quality standard exceedances in September 2024 cannot all be feasibly linked to the landfill. On the four dates when exceedances were recorded, NRW received one odour complaint. Odours may have been detected in the area but considered to be from other sources and therefore not reported to NRW. The data collected at the static monitor to date will act as a good baseline for monitoring changes in ambient air quality (hydrogen sulphide) when waste disposal activities recommence at Withyhedge Landfill.

8. Next Steps

There is a shared commitment towards continuing the multi-agency working through the AQG and IMG until such time as partners are reassured that operations on-site are controlled, and community impact is minimised.

Furthermore, the AQG would support continuing air quality monitoring for a period until it can be shown that landfill emissions are suitably controlled following the site re-opening for waste.

In this regard, the AQG will therefore continue to monitor and review ongoing monitoring strategy, and work in conjunction with the IMG to provide continued information via website and public engagement to members of the local community.

9. Appendices

Appendix 1 - Geotechnology reports

Appendix 2 - PCC Acuity tables

Appendix 3 - NRW tables

Appendix 4 - Ricardo Summary Report