


RICARDO
EMAQ+

Odour from Waste Processes



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Air Quality



At Ricardo we have a dedicated team of AQ specialists and look forward to helping you with any of your air quality challenges:

- ISO 17025 UKAS accredited **QA/QC audits** – required by LAQM TG (22)
- **Data management**, data collection, checking, validation, ratification etc
- **Local site operations**, calibrations/call outs
- **Web reporting**
<http://www.airqualityengland.co.uk/>
- **Routine data reporting** – weekly, monthly, quarterly, annual – for example
http://www.airqualityengland.co.uk/assets/reports/291/KensingtonChelsea_month_2019_01.html
- **Short term monitoring surveys** (site installation/decommissioning through to reporting)
- Long term station hire
- Free advice on station installation and best practice
- Procurement of analysers and installation to LAQM TG (22) or AURN standards
- **Low cost sensor measurements**, network management
- **Real world vehicle emissions monitoring** aiding Action Planning
- **Mobile Monitoring** for point source and concentration contour mapping
- **Diffusion tube surveys**
- **Air quality forecasting** and public dissemination (via sms text, email, web, social media etc.)
- Air quality reporting
- LAQM TG (22) Annual Status Reporting (ASR), Detailed Assessment
- CAZ/LEZ consultancy
- Expert witness and Expert Advice
- Air Quality Modelling
- Odour sampling, analysis and management

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Nigel Gibson



- >30 years nuisance assessments
- Odour/Dust measurement expertise
- Impact assessment expertise
- Emission control expertise
- Expert Witness Court/Public enquiry



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- Ricardo Analyst Consultant
- EMAQ Trainer
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Today's webinar



- Our session today considers odour management from waste facilities.
- The day to day regulation of these sites is generally down to the Environment Agency, SEPA or NRW.
- However all local authority will have some waste facility in their district. This image shows the distribution of waste sites around the Oxford and Didcot areas.
- This session has been developed to assist you understand the nature of odour from waste facilities using the simple FIDOL factors.



Google (2021). Available at: <http://maps.google.co.uk>



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Introduction



Firstly, lets remind ourselves the regulations that can be used to control odour from waste sites:

- The planning process should provide an ideal opportunity to limit the effects of odour;
- Waste sites are generally regulated installations (albeit regulated by the EA, SEPA, NRW). This should provide another opportunity to deal with odour;
- As a last resort you have your obligations through the statutory nuisance provision of the EPA Part III (1990).



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Planning – Development Control Guidance



National Planning Policy Framework (2023)

- Developments need to comply with the NPPF: 180 “Planning policies and decisions should contribute to and enhance the natural and local environment by preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability.



National Planning Policy Framework

December 2023



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Planning – Development Control Guidance



National Planning Policy Framework (2023)

- NPPF advises with respect to the agent of change (193): 180 “Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (...). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established.
- Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or ‘agent of change’) should be required to provide suitable mitigation before the development has been completed.”



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Permitting



The Environmental Permitting (England and Wales) Regulations 2016 (as amended)

- Permit conditions (and operator plans) should be designed 'to ensure that the installation is operated in such a way that—
 - (i) all appropriate preventive measures are taken against pollution, in particular through the application of best available techniques, and
 - (ii) no significant pollution is caused;
- Permitted waste facilities fall under the Agency regulation.
- For a new permitted facility emission control is generally left to the permit to resolve – the planning system assumes this can be done satisfactorily (NFFP 194).



Permit with introductory note

The Environmental Permitting (England & Wales) Regulations 2016

Leicestershire County Council
 Barton Waste Transfer Station
 Unit 9
 Interlink Way South
 Barton
 Coalville
 Leicestershire
 LE37 1PQ.

Permit number
 EPR/WE9511AA

3.2 Odour

- 3.2.1 Emissions from the activities shall be free from odour at levels likely to cause pollution outside the site, as perceived by an authorised officer of the Environment Agency, unless the operator has used appropriate measures, including, but not limited to, those specified in any approved odour management plan, to prevent or where that is not practicable to minimise the odour.



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Statutory Nuisance



Environmental Protection Act 1990, Part III, Section 79 (1) (d)

- any dust, steam, **smell** or other effluvia arising on industrial, trade or business premises and being prejudicial to health or a nuisance;
- BPM defense available for industrial, trade & business premises.
- There is an expectation that odour management offered by a well managed waste operation should be dealt with by the Agency through the permitting process.
- However, in certain circumstances, the sheer number of complaints attributed to a waste site or the speed with which the permitting system can address odour may be too slow, may mean that you need to consider taking action.



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Statutory Nuisance



In extreme cases abatement notices have been served on permitted waste sites by local authorities

As this article indicates, uniquely the local authority is looking to enforce the abatement notice on a permitted facility. This will require permission from the Secretary of State

Ideally before suggested steps are taken you will liaise with the regulator to reach a satisfactory resolution.

Extract from 'Circular – for resource and waste professional' (May 2024)

The Environment Agency recorded 167 odour reports/complaints between 29 April and 5 May compared to 694 between 4 and 10 March.

Data from mobile monitoring facilities near Walleys Quarry showed hydrogen sulphide concentrations were above the World Health Organisation odour annoyance guideline level 2.4% of the time 0.3km from the site between 29 April and 5 May.

A fall from 34% of the time between 4 and 10 March.

In April, Newcastle-under-Lyme Borough Council announced it is preparing legal action against the operators of Walleys Quarry for alleged breaches of an Abatement Notice.

The sustained nature of this problem is very unusual and it's possible that some of the consequences are less obvious than others.

An Abatement Notice became enforceable in March 2023 following a successful legal action brought by the Borough Council. It obliges the operator to not create or allow statutory odour nuisance.



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Turning To Odour



- An odorant is a substance which stimulates the human olfactory system so that an odour is perceived. Most odours are a **mixture of many chemical compounds** that interest to produce what we detect as an odour.
- Human nose is very sensitive with over 5 million scent receptors which allows us to detect concentrations as low as few ppb in air – **most monitoring devices cannot detect concentration at these levels.**
- The main concern with odour is it's ability to cause a response in individuals that is considered to be **objectionable or offensive -> complaints.**



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Odour Nuisance – Technical Definition



The cumulative effect on humans of repeated events of annoyance caused by exposure to odours over an extended period of time, that leads to modified or altered behaviours [e.g. making a complaint, closing windows].

Many waste operations will give rise to odour some of which could cause annoyance. In the following sections we:

- Describe the waste processes you may come across;
- Identify the factor which can exacerbate odour emissions;
- Identify what can be done to manage odour.



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How We Consider Will Consider The Effects Of Odour



For this session will look to consider odour based on FIDOL :

Factor	Odour exposure parameters
Frequency	How often an odour emission is likely to occur.
Intensity	The strength of the odour that is emitted.
Duration	The duration that an emission will occur for.
Odour unpleasantness	Odour unpleasantness/offensiveness of the emitted odour.
Location	The type of land use and nature of human activities in the vicinity of an odour source.



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Waste Sites You May Have Come Across



- Civil amenity sites or household waste recycling centre is a facility where the public can dispose of household waste and also often containing recycling points. They recyclable waste such as green waste, metals, glass etc.
- In this example bins are provided for member of the public to deposit waste into containers.



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Emissions From HWRC Sites And Their Controls



- Odour emissions linked to type of waste, how long it is stored for and temperature.
- Smelliest waste handled is likely to be green waste and paint waste.
- Emission may increase during warmer weather.
- More waste will be received over weekend, particularly around bank holidays.

Unless neighbouring residential area, HWRC odour should not be an issue.

If necessary odour management can be improved by increasing frequency of skip removal.



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FIDOL Factors For CA Sites



Factor	Odour exposure parameters
Frequency	Odour emissions worst during busy summer periods.
Intensity	Waste materials tend to be reasonable fresh so strength of the odour concentration generally low.
Duration	The duration that an emission will be linked to the amount of waste on site.
Odour unpleasantness	Odour generally not too unpleasant/offensive – likely to be green waste odour.
Location	Effects of odour will be localised on site.



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Waste Sites You May Have Come Across



- **Waste transfer station** is a facility where waste from various sources is consolidated before being further transported to an end point of disposal, usually landfill or waste-to-energy facilities. The WTS acts as a collection point for waste streams, where collection vehicles and containers are emptied, the waste screened, then loaded into larger transport vehicles for long-haul transport.



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Emissions From WTS



- Odour emissions linked to type of waste, how long it is stored for and temperature.
- Smelliest waste handled is likely to be residual waste, food waste and green waste.
- Odour will be higher during summer/warmer periods.
- Odour will be higher if waste is allowed to compost.
- Odour will be higher following bank holidays when waste is stored for longer before initial collection.
- Odour will increase when waste is disturbed (turning, loading into HGV etc).



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Example of residual waste that has started to compost, releasing steam and odour



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Emissions Control From WTS



Typical odour control may include:

- Strict Waste Acceptance Criteria
- Use a building to contain particularly odorous wastes
- Use of bays to act as odour breaks
- Use of daily cover i.e. covering waste with an inert materials
- Ensuring minimal handling of material



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Example of atomised odour neutraliser in use



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Emissions Control From WTS Cont'd



- Routine housekeeping and regular cleaning of site equipment with the use of appropriate disinfectants or chemicals;
- Priority for the removal of any odorous wastes from the site
- Use of odour abatement equipment – natural ventilation and odour atomiser spray are widely used



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Example of atomised odour neutraliser in use

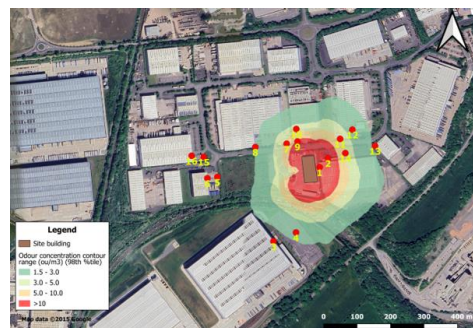


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Impact Of Odour From A WTS



- Ricardo's odour team carried out an olfactometry assessment of a WTS handling waste stored on site for 24 hours.
- Test found that winter emission concentration from:
 - Undisturbed waste was $1600 \text{ ou}_E/\text{m}^3$;
 - Disturbed waste was $2300 \text{ ou}_E/\text{m}^3$;
 - Disturbed waste with odour neutraliser on was $2200 \text{ ou}_E/\text{m}^3$.
- Impact on the neighbouring clothing factory exceeded $50 \text{ ou}_E/\text{m}^3$ which exceed the EA odour benchmark of $3 \text{ ou}_E/\text{m}^3$ as a 98%ile.
- In this situation a more robust abatement system should have been required. This may be an example of the EA permittees not appreciating the nature of the receiving environment and the implication that could have on BAT for odour control.



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Example of an odour impact assessment of a WTS



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FIDOL Factors For WTS Sites



Factor	Odour exposure parameters
Frequency	Odour emissions will occur all of the time.
Intensity	Waste materials will give rise to moderate odour concentration which will be linked to the nature and age of the waste.
Duration	The duration that an emission will occur for as long as waste is on site.
Odour unpleasantness	Odour can be unpleasant/offensive – smells of dirty bins.
Location	Effects of odour will be localised on site.



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Waste Sites You May Have Come Across



- **Materials recovery facilities** are specialised plant that receives, separates and prepares dry recyclable materials. The recyclables go through a variety of mainly mechanical and some manual processes to obtain maximum recovery of materials that will re-enter the manufacturing process as a valuable commodity.



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Emissions From An MRF And Their Control



- Sites tend to receive dry mixed waste which should have a low odour potential.
- Emission control, mainly for dust, will be used for hand-picking areas.
- General dust and odour control relies on aerosol system as shown.
- Nuisance potential is limited through careful siting of facilities away from sensitive receptors.



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FIDOL Factors For MRF Sites



Factor	Odour exposure parameters
Frequency	Odour emissions will occur all of the time.
Intensity	Waste materials should give rise to low odour concentration because only dry recyclables are handled.
Duration	The duration that an emission will occur for as long as waste is on site.
Odour unpleasantness	Odour will be moderately unpleasant/offensive – smells of dirty bins.
Location	Effects of odour will be localised on site.



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Waste Sites You May Have Come Across



- **Mechanical biological treatment facility** stabilises and separate waste which is not suitable for recycling, extract recyclable materials and produces a solid recovered fuel (SRF) for industrial thermal applications. The process may involve a biodrying stage to increase the calorific value of the fuel.



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Emissions from a MBT and their Control



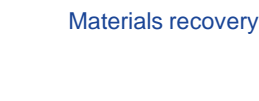
Depending on the design odour emissions from an MBT arise from receipt and storage of residual waste:

- Waste may be stored on floor or in a reception pit;
- Management of residual waste in reception pits is important as material at the base of the pit may not be removed by grab system and will decay;
- Scale of emissions will depend on the amount of waste handled and stored;
- Reception building should be enclosed to minimise fugitive emissions, held under negative pressure and passed to a suitable odour control system;
- Sound building integrity and fast acting doors will help to minimise emissions. Emissions cannot be avoided because of stream of waste delivery vehicles.



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Waste reception



Materials recovery



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Biodrying



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Emissions from an MBT and their control



Depending on the design odour emissions from an MBT arise from materials recovery area:

- Waste will pass into the material recovery area where the bagged waste is separated;
- Plastic, paper and metal fractions are recovered;
- The final product is moved on to the next phase;
- Emissions will be dependent on the nature of the waste and will be controlled using local extraction directed to key parts of the recover equipment;
- The extracted air will be passed to a suitable odour control system.



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Waste reception

Materials recovery



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Biodrying



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Emissions from an MBT and their control



Depending on the design odour emissions from an MBT arise from the final process stage and residual waste may pass:

- To a combustion process. Generally, the odour potential from this operation should be low;
- To a biodrying operation. Here the action of composting will reduce easily biodegradable material and water. The odour emission from this operation will be high to very high;
- To an anaerobic digester where methane is generated from. The gas produced will contain a high level of hydrogen sulphide. The gas may be conditions for use in the gas grid or may be directed to a CHP for heat and electricity recovery.



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Waste reception

Materials recovery



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Biodrying



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FIDOL Factors For MBT Sites



Factor	Odour exposure parameters
Frequency	Odour emissions will occur all of the time but will be ameliorated by odour control.
Intensity	Waste materials could give rise to moderate to high odour concentration this will depend on how the residual waste is treated but will be ameliorated by odour control.
Duration	The duration that an emission will occur all of the time but will be ameliorated by odour control.
Odour unpleasantness	Odour will be moderately unpleasant/offensive – this will depend on the effectiveness of odour control.
Location	Effects of odour will be dependent on the size of the facility and can affect a large area if controls are ineffective.



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Waste Sites You May Have Come Across



- **Composting facilities** use an aerobic method of decomposing organic solid wastes to produce a recycle organic material. The process involves decomposing organic material into a humus-like material, known as compost, which is a good fertilizer for plants.
- Typically, a composting facilities will process green or garden waste.
- Some sites may treat food waste along-side green waste. The latter falls under animal by-product regulation and requires that the compost is held at 70 °C for 1 hour. These sites will employ an in-vessel stage to achieve the ABP compliance.



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Emissions From Green Waste Composting And Their Control



Emissions will arise from:

- The receipt and initial shredding of waste.
- The compost activity in the windrows with peak emission occurring when the composting is turned
- The final process of composted material to remove large items.
- Scale of emission linked to throughput and surface area of operation

Factors that influence emission are:

- Wet material → anaerobic conditions therefore need to manage moisture content
- Excessive nitrogen causes rapid composting) → anaerobic conditions therefore need to manage C:N ration of feed stock
- Lack of oxygen → anaerobic conditions therefore need to monitor and manage oxygen



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Emissions From Mixed Waste Composting And Their Control

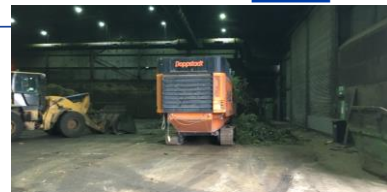


Emissions will arise from:

- The receipt and initial shredding of waste, this need to take place within a building.
- The invessel phase of the operations where composting must achieve 70°C for 1 hour. This can take place in series of vessels.
- A maturation compost activity in the windrows with peak emission occurring when the composting is turned.
- The final process of composted material to remove large items.
- Scale of emission linked to throughput and surface area of operation

Factors that influence emission are:

- Wet material → anaerobic conditions therefore need to manage moisture content.
- Excessive nitrogen causes rapid composting) → anaerobic conditions therefore need to manage C:N ration of feed stock.
- Lack of oxygen → anaerobic conditions therefore need to monitor and manage oxygen (e.g. through forced aeration or regular turning).



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FIDOL Factors For Composting Sites



Factor	Odour exposure parameters
Frequency	Odour emissions will occur all of the time but will be ameliorated by compost management and/or odour control.
Intensity	Waste materials could give rise to moderate to high odour concentration this will depend on nature and control of the feedstock and whether emissions are controlled.
Duration	The duration that an emission will occur all of the time but should be ameliorated by compost management and/or odour control.
Odour unpleasantness	Odour will be moderately unpleasant/offensive – this will depend on the effectiveness of compost management and/or odour control.
Location	Effects of odour will be dependent on the size of the facility and can affect a large area if controls are ineffective.



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Waste Sites You May Have Come Across



- **Landfill operations receive** waste according to set waste-acceptance criteria. The waste is then unloaded at the tipping face or working front. After loads are deposited, bulldozers spread and compact the waste on the working face. Waste is covered with soil or alternative materials daily.
- The landfilling process involves the anaerobic decomposition of waste to landfill gas. Landfill gas extracted to produce electricity. Leachate that accumulates in the landfill is extracted and treated.



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Emissions From Landfills



Emissions will arise from:

- The receipt and initial tipping of waste on the tipping face. This will smell of black bag waste;
- As the material is compacted anaerobic breakdown will commence. Landfill gas odour will become more noticeable;
- Poor capping allows landfill gas to escape;
- In the event that the leachate level in the landfill rises, wetted waste will generate gas faster;
- Defects in infrastructure can all lead to elevated landfill gas odour.



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Emission Control From Landfills



- Effective use of waste acceptance can avoid odorous waste being received.
- Minimise acceptance of sulphate rich wastes.
- Tipping area should be as small as possible.
- Gas extraction should be installed across the whole site.
- Adequate suction should be applied to gas extraction network to ensure gas capture under all atmospheric conditions.
- Effective capping should be applied to the whole site to assist in minimising landfill gas loss.
- Leachate levels should be managed to avoid saturation of waste.



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FIDOL Factors For Landfill Sites



Factor	Odour exposure parameters
Frequency	Odour emissions will occur all of the time but will be ameliorated by phasing of infilling, and effectiveness of containment and gas extraction.
Intensity	Waste materials should give rise to high odour concentration this will depend on how the sulphate content of the waste, and effectiveness of containment and gas extraction.
Duration	The duration that an emission will occur all of the time but will be ameliorated by odour management.
Odour unpleasantness	Odour could be highly unpleasant/offensive – this will depend on the effectiveness of odour management.
Location	Effects of odour will be dependent on the size of the facility and can affect a large area if controls/management are ineffective.



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FIDO Factors For Landfill Sites



Factor	Odour exposure parameters
Frequency	Odour emissions will occur all of the time but will be ameliorated by phasing of infilling, and effectiveness of containment and gas extraction.
Intensity	Waste materials should give rise to high odour concentration this will depend on how the sulphate content of the waste, and effectiveness of containment and gas extraction.
Duration	The duration that an emission will occur all of the time but will be ameliorated by odour management.
Odour unpleasantness	Odour could be highly unpleasant/offensive – this will depend on the effectiveness of odour management.
Location	Effects of odour will be dependent on the size of the facility and can affect a large area if controls/management are ineffective.
Other considerations	Unlike other waste processes atmospheric conditions can influence odour emission. This may result in worst odour emission at night and/or during winter months.



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Summary



- This session has characterised the main waste operations that you will come across.
- There is an expectation that the planning and permitting system should be capable of regulating odour emissions and that operators implement effective odour management practices.
- From time to time there may be instances where odour control measures may not be effective. In this situation local authorities need to liaise with the regulator to reach a satisfactory resolution.
- In extreme cases you may have to resort to your obligations under EPA part III. This is expensive and time-consuming option.



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Thank you!

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